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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
SINGH, PREM C	
ART UNIT	PAPER NUMBER
1797	
MAIL DATE	DELIVERY MODE
09/01/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/613,422	BULL ET AL.	
	Examiner	Art Unit	
	PREM C. SINGH	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 August 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,5-18,21,22,25-27 and 30-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5-18,21,22,25-27 and 30-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Amendment to claims 1, 2, 6, 21, 22, 25, 26, 30, 32, 34, 35 and 37 is noted.

2. The teachings of non-patent literature (Fischer-Tropsch Technology by A. Steynberg and M. Dry, Elsevier) are noted.

3. New ground of rejection necessitated by amendment to the claims follows.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1, 2, 5-18, 21, 25-27, 30, 31 and 34-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cain et al (US Patent 2,877,257) ("Cain") in view of Moore, Jr. et al (US 2002/0173556 A1) ("Moore").

6. The Cain reference discloses a process for removing metal contaminants from a Fischer-Tropsch derived hydrocarbon stream. At least a portion of these contaminants would necessarily originate from the processing equipment and catalyst. The process comprises passing the hydrocarbon stream to a treatment zone where the hydrocarbon stream contacts an aqueous acidic stream that is passed to the treatment zone (i.e., extraction column). The acidic stream should have a strength corresponding to concentrations of sulfuric acids ranging from about 1.5 to about 50 weight percent. These concentrations would necessarily be within the claimed ranges. The resulting mixture that includes precipitated solids is then separated to recover an extracted

hydrocarbon stream and a modified acidic stream. The separation of precipitated solids should necessarily be using an appropriate device, including filtration. The acidic stream can comprise an inorganic acid such as sulfuric acid or an organic acid such as acetic acid. The acidic stream used in the process may also comprise the aqueous phase produced in the F-T process. This produced aqueous phase contains acetic acid. Also, the examples in the Cain reference clearly are batch treatments but it is also clear from Figure 2 that the process can be operated continuously. The extraction step is performed until essentially all the iron is removed from the hydrocarbon stream. This would necessarily disclose the limitations of claim 26 (See column 1, lines 15-36; column 2, lines 48-51; column 3, lines 9-35 and 52-75; column 4, lines 1-43; column 7, lines 41-73; column 8, lines 1-24; the examples, and Figure 2). Since Cain is using a process similar to the claimed process, it is expected that the size of the contamination is in a range including as claimed.

The Cain reference also discloses that acetic acid is used in the extraction processes. Therefore, such an extraction would necessarily produce a third phase as claimed.

The Cain reference does not disclose using a slurry reactor and temperature, a cobalt catalyst in the F-T step, size of the contamination, does not disclose that aluminum is removed from the hydrocarbon and the hydrocarbon product is paraffinic and waxy. The Cain reference also does not disclose the extraction conditions of claim 27 and does not disclose passing the acid extracted F-T derived hydrocarbon stream to a hydroprocessing reactor and then hydroprocessing this stream.

The Moore reference discloses that F-T streams comprising primarily paraffinic waxy hydrocarbons (See paragraph 0003, 0081) are produced in processes that utilize slurry reactor (See paragraph 0078, 0081), a temperature of 300-700°F (See paragraph 0076) and catalysts such as iron or cobalt (See paragraph [0079]). The Moore reference also discloses that F-T derived streams may be fractionated (i.e., distilled) and hydrotreated (See paragraphs [0047] and [0048]). Moore further discloses that the F-T catalyst generally comprises support materials including alumina (See paragraph 0079). This clearly indicates that when Moore is using a slurry reactor, cobalt catalyst and alumina support, similar to the claimed invention, Moore's product stream is necessarily expected to contain Al contamination in particulate form as claimed. Since extraction step in Cain's process removes substantially all the iron, the treated stream is expected to be free of foulants likely to plug the catalyst beds in the hydrotreating reactor.

Moore reference indicates that iron or cobalt catalysts can be used in the FT synthesis. Thus, both catalysts are expected to be equally effective and one can be substituted by the other.

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Cain by using a cobalt catalyst and a slurry reactor in the F-T step as suggested by Moore. It is expected that the Cain's process will be equally effective with cobalt catalyst also. See *In re Fout, 675 F.2d 297, 213 USPQ 532 (CCPA 1982).* Thus, the modified Cain process, while removing dissolved and occluded iron contamination from crude hydrocarbon solutions of oxygenated organic compounds present in the FT product stream (See Cain, column

1, lines 15-36; column 2, lines 48-51; column 3, lines 9-35 and 52-75; column 4, lines 1-43; column 7, lines 41-73; column 8, lines 1-24; Moore, paragraph 0079), should also be removing Al contamination in particulate form as claimed.

It also would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Cain by distilling and hydrotreating the purified hydrocarbon stream as suggested by Moore because a stream with fewer undesired components such as olefins will be produced. Although Cain does not appear to specifically disclose temperature and residence time in the extraction step, it would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize optimum conditions, including as claimed, for an effective removal of contaminants.

7. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cain et al. (US 2,877,257) ("Cain") in view of Moore, Jr. et al. (US 2002/0173556 A1) ("Moore") as applied to claims 1, 2, and 5-18 above, and further in view of Zhou (US 6,476,086 B1) ("Zhou").

The previously discussed references do not disclose adding a surfactant to the hydrocarbon stream.

The Zhou reference discloses a process for separating contaminant particles from an F-T derived stream. The process comprises contacting the stream with a composition that comprises a surfactant. The reference also discloses that filtration

techniques have been used to separate solid contaminants from F-T derived streams (See column 1, lines 29-40 and 65-67; column 2, lines 1-67; and column 3, lines 1-11).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the teachings of the previously discussed references by adding a surfactant to the hydrocarbon stream as suggested by Zhou because the addition of a surfactant will enhance the separation process.

8. Claims 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cain et al. (US 2,877,257) ("Cain") in view of Moore, Jr. et al. (US 2002/0173556 A1) ("Moore") and Zhou (US 6,476,086 B1) ("Zhou").

With respect to claims 32 and 33, Cain reference discloses production of Fischer-Tropsch derived hydrocarbon stream by passing syngas to a FT reactor (See column 1, lines 30-54). Figure 2 of Cain invention also discloses that the downstream processing of the FT products is a continuous process. This implies that FT synthesis should also be a continuous process.

As discussed earlier, the Cain reference does not disclose that an additive is added to the reactor and does not disclose filtering the hydrocarbon stream after the adding step. The reference also does not disclose adding a surfactant to the hydrocarbon stream or passing the F-T derived hydrocarbon stream to a hydroprocessing reactor.

The Moore reference discloses that F-T streams are produced in processes that utilize catalysts such as iron or cobalt catalysts. See paragraph [0079]. The Moore reference also discloses that F-T derived streams may be fractionated (i.e., distilled) and hydrotreated (See paragraphs [0047] and [0048]). Moore also confirms that the FT synthesis is a continuous process (See paragraph [0076]).

The Zhou reference discloses a process for separating contaminant particles from an F-T derived stream. The process comprises contacting the stream with an additive composition that comprises a surfactant. The reference also discloses that filtration techniques have been used to separate solid contaminants from F-T derived streams (See column 1, lines 29-40 and 65-67; column 2, lines 1-67; and column 3, lines 1-11). Zhou also discloses use of an internal filter for slurry-bed iron catalyst FT reactors (See column 1, lines 29-31, 50-53).

It would have been obvious to one having ordinary skill in the art to modify the process of Cain by adding the acid to the reactor because the same purification would take place with the added benefit of cost savings due to the reduced equipment requirement.

It also would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Cain by filtering the product resulting from the extraction step as suggested by Zhou because filtering will remove any solid contaminants from the product.

It also would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Cain by adding a surfactant to the hydrocarbon stream as suggested by Zhou because the addition of a surfactant will enhance the separation process.

It also would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Cain by hydrotreating the purified hydrocarbon stream as suggested by Moore because a stream with fewer undesired components such as sulfur, nitrogen and olefins, will be produced.

Response to Arguments

9. Applicant's arguments filed 08/16/2010 have been fully considered but they are not persuasive.

10. In the arguments on page 8-10, the Applicant argues that:

> The nature of the stream being treated in the presently claimed methods is significantly different from the steam in Cain. In fluidized processes, as taught in Cain, there is no continuous liquid phase within the reactor and the reactor operates as a two-phase gas-solid process. In contrast with Cain, the independent claims as amended specify that the hydrocarbon stream to be treated is a *waxy paraffinic product steam* produced in a slurry type reactor using

a catalyst comprising cobalt at a temperature between 400 and 550 °F (204 and 288 °C). The vapor stream is predominantly the lighter products, while the liquid stream is predominantly waxy (C_{20}+). Claims 1, 25, and 32 are concerned with the treatment of this predominantly waxy liquid stream withdrawn from the reactor.

In response, it is the examiner's position that the Office action has shown obviousness rejection based on Cain and Moore together (emphasis added). Cain simply discloses Fischer-Tropsch (FT) synthesis using iron catalyst (See column 1, lines 26-36) without specifically disclosing the details of the FT process. This is the reason why Moore reference has been used.

Moore discloses using a three-phase slurry bed reactor operating at 400-550°F using iron and cobalt catalysts producing tail gas to middle distillates as light products and highly paraffinic waxy products in the C_{20}+ range (See paragraph 0076, 0079, 0081).

11. In the arguments on page 10-11, the Applicant argues that:

The present invention is thus concerned with the problem of removal of contamination comprising aluminum metal present in a complex organic matrix from a *waxy paraffinic product stream* withdrawn in liquid form from a slurry reactor. In contrast, Cain is concerned with the removal of dissolved or occluded iron or iron compounds from a hydrocarbon stream containing between 10 and

> 30 % oxygenates that is withdrawn together with the gaseous phase from a fluidized bed reactor. A skilled person faced with the difficulty of removing contamination comprising aluminum metal present in a complex organic matrix from a waxy paraffinic product stream withdrawn in liquid form from a slurry reactor, will have no incentive to consider the teaching of Cain. None of the other prior art documents of record remedies this defect.

In response, it is the examiner's position that as discussed earlier, the rejection is based not only on Cain, but on the combined teachings of Cain and Moore, which discloses a slurry reactor using alumina iron/cobalt catalyst on alumina support (See Moore, paragraph 0079, 0081). This clearly indicates that during three-phase slurry bed operation, the contamination from the waxy paraffinic product stream in combined Cain/Moore invention is identical to the contamination from the claimed process.

12. In the arguments on page 11-12 with regard to claim 22, the Applicant argues that:

> Moore is merely cited for the propositions that Fischer-Tropsch streams are produced in processes that utilize catalysts such as iron or cobalt catalysts and that Fischer- Tropsch derived streams may be fractionated (i.e. distilled) and hydrotreated. Cain in view of Moore does not disclose or suggest a method for removing contamination from a *Fischer-Tropsch derived waxy paraffinic product.* Cain in view of Moore does not disclose or suggest removing *Al contamination in particulate form.* Moreover, Cain in view of Moore does not disclose or suggest

filtering the at least one acidic extracted Fischer-Tropsch derived hydrocarbon stream to remove at least a portion of the Al contamination in particulate form.

In response, it is the examiner's position that as discussed earlier, combined teachings of Cain and Moore disclose a slurry reactor using alumina iron/cobalt catalyst on alumina support (See Moore, paragraph 0079, 0081) expected to be producing Al contamination in particulate form from the waxy paraffinic product stream as claimed.

13. In the arguments on page 12-13 with regard to claim 32 and 33, the Applicant argues that:

As described above, the presently claimed process is significantly different than the process of Cain and one of skill in the art would not merely combine process features of Moore with Cain. Moreover, in no way does Cain, Moore, or Zhou disclose or suggest providing an additive to the contents of the Fischer-Tropsch reactor to precipitate soluble contamination within the reactor. Applicants note that the Examiner asserts that it would have been obvious to one having ordinary skill in the art to have modified the process of Cain by adding the acid to the reactor because the same purification would take place with the added benefit of cost savings due to the reduced equipment requirement. Applicants maintain that it would not be practical or of added benefit to add a water solution of acetic acid to the Fischer Tropsch reactor. Fischer Tropsch reactions are conducted at temperatures of 400 - 550 °F, as presently claimed. A water solution would significantly cool the reactor causing the reactor to need to be reheated to

reaction temperature to conduct Fischer Tropsch reactions. Furthermore, a water solution would evaporate at the reaction temperatures, and thus, could not be used to extract the product inside the reactor, unless first the reactor was cooled significantly and then heated again to reaction temperature.

In response, it is the examiner's position that combination of Cain and Moore has already been addressed. Further, Zhou discloses a process for separating contaminant particles from an F-T derived stream (See abstract). The process comprises contacting the stream with a composition that comprises a surfactant, acid and water (See column 2, lines 11-67; column 3, lines 1-12). The reference also discloses that filtration techniques have been used to separate solid contaminants from F-T derived streams (See column 1, lines 29-40 and 50-53). Zhou further discloses that the contaminants can be removed in an internal filter within the slurry bed FT reactor (See column 1, lines 50-53). Obviously, Zhou is disclosing use of aqueous acid solution in the reactor itself. Therefore, it would have been obvious to one with ordinary skill in the art at the time of invention to modify Cain invention and use the aqueous acid solution in the slurry reactor as disclosed by Zhou for contaminant removal in the reactor and thus reduce the size of the downstream separation unit.

14. In conclusion, the claimed invention is *prima facie* obvious over combined teachings of Cain, Moore and Zhou.

Conclusion

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PREM C. SINGH whose telephone number is (571)272-6381. The examiner can normally be reached on 7:00 AM to 3:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PS 082710

/PREM C SINGH/
Examiner, Art Unit 1797